

**ADAPTOR DEVICE FOR DOMESTIC SHOOTING PRACTICE
WITH LARGE-CALIBRE HAND-GUNS**

Reference to Related Application:

5 The present application is a continuation of application
serial number 08/888,939.

Field of the Invention:

10 The present invention is related to shooting practice
with firearms and concerns a device for enabling large-
calibre firearms to be fired with small-calibre missiles or
ammunition. The invention particularly concerns an adaptor
device for a large-calibre gun for using low-cost and freely-
available munition such as air-pellets and pistol primers,
utilizing the thrust of the primers to safely fire pellets
with a similar degree of accuracy and range but much less
15 kinetic energy in comparison with the standard high-calibre
ammunition rounds.

20 The adaptor devices of the invention are devised for use
on large-calibre guns in places not specially protected as
shooting ranges, for instance. Among other uses, the
invention allows indoor practice or teaching with rifles,
pistols and revolvers, as well as handling collection-item or
antique firearm pieces without wearing the barrel out.

Background of the Invention

25 Practice with large-calibre firearms in times of peace is
restricted to shooting ranges, whereto the shooter has to
travel with all the precautions, expense and bother this im-
plies. By no means should firearms such as 9 mm pistols or
•38 or •357 Magnum revolvers, for example, loaded with
standard-calibre ammunition be fired at home, be it for
30 reasons of practice, training or learning, because of the
serious risk of death or injury to the household and the

neighbourhood as well as because of the loud noise these guns make when going off.

For this reason, the guns one may practice with without leaving ones' houses~~x~~ are of the compressed-air type, using 4.5 or 5.5 mm pellets as ammunition and even then taking care. However, using compressed-air guns for shooting practice is a rather poor substitute for those who wish to learn or become abler with a firearm of a larger calibre. The use of compressed air instead of gunpowder and the differences in weight, size and blast backlash between one kind of gun and the other significantly vary the responses and feel one gets from handling guns.

Brief Review of the Prior Art:

The prior art has indulged heretofore in attempting to develop suitable adaptor means using readily available pellets for reduced-calibre missiles and primers as detonators.

U.S. patent 4,361,093 to Michael Saxby dicloses an adaptor device for firing pellets with a larger-calibre firearm, such as a pistol, revolver or rifle, using primers. The adaptor comprises a two-part ammunition round including a casing externally shaped as a .38 or larger-calibre round of ammunition for loading in a .38 or larger-calibre pistol or revolver in the same way as an ordinary round of ammunition. The casing has a longitudinal passage housing a tubular insert. A tapered socket is provided behind the insert at the base of the casing for holding a 4.5 mm small pistol primer. The forward end of the insert forms a seat for a .177 or .22 pellet in the casing passage. Saxby suggests that the diameter of the forward portion of the passage be slightly larger than the nominal pellet diameter but slightly smaller than the overall maximum diameter of the pellet, i.e. of the pellet skirt. A narrow flame duct extends through the insert for conveying and moderating the thrust of the primer blast

on the pellet when the trigger is pressed and the firing pin of the firearm strikes the primer.

In some of Saxby's embodiments for pistols and revolvers, the adaptor device further includes a removable barrel liner which is inserted through the muzzle of the gun. The liner is a tubular member provided with an O-ring or resilient means at the breech end and clamping means at the muzzle end, the liner small-calibre bore abutting and naturally aligning with the casing chamber. Suggested clamping means is a split ring or plural collets associated with a threaded fastener which screws on to an extension of the liner. Another embodiment of the adaptor device, for 5.56 mm calibre rifles, is designed without the barrel liner.

The socket is dimensioned for the primer to snugly fit therein, meaning that the primer has to be push-fitted into the socket. In some of Saxby's embodiments, the socket is formed in the base end of the insert and both are supplied together as a unit. The gun is loaded by first push-fitting the pellet and then the insert forwards into the casing chamber, avoiding the risk of the user pushing primers into position. In another embodiment, the primer is seated against the base end of the insert and the loaded casing may be supplied as a unit.

U.S. patent 4,735,009 to Thomas Jett discloses an adaptor kit which allegedly simplifies Saxby's cartridge casing. The casing is a one-piece insert including a pellet seating on the nose end of the casing passage. This enables loading the pellet through the nose end of the cartridge. Tools are disclosed for assisting in loading the primers and pellets into the adaptor.

Jett further discloses a liner for mounting with O-rings inside the bore of the hand-gun barrel. Substantial lubrication of the bore and the O-rings is recommended before inserting the liner in the barrel.

In all the above-cited art, the primer seat is dimensioned for the primer to fit snugly, that is, a certain amount of pushing force is required to place the primer in its proper position. This represents certain drawbacks, not the least of which is the risk of the primer detonating under manual pushing pressure. In fact, Jett suggests placing the primer on a flat surface and pressing the base orifice of the cartridge on to the primer, risking explosion and bodily danger such as loosing a finger.

Moreover, only primers of a predetermined size may be used with such adaptor devices. Specifically, 5.5 mm large-pistol primers may not be used with a device designed for 4.5 mm small-pistol primers.

There is also the risk of the primer falling out of the seat and the difficulty in removing a spent primer remains. Jetts's '009 patent suggests a gripping tool for facilitating reloading a primer. It is likewise difficult to safely disarm an unused primer using an inertial bullet puller.

Jetts's '009 patent is forced to locate the pellet seat right in the nose of the casing, meaning that the pellet skirt is deformed at loading. At firing, the pellet has just begun to accelerate when it leaves the casing. In an application in a revolver, the liner rear end may not abut the cartridge nose end so that firing power is lost as the detonation gases leak out of the liner.

In pistol applications, the liner abuts the cartridge casing and the latter is of exactly the same length as a standard-calibre ammunition round. There is thus the danger of loading and attempting to fire real ammunition with the liner accidentally left in the barrel, with disastrous consequences. In revolver applications, the ammunition rounds are of fixed length and thus suitable only for revolvers with cylinders of that size; otherwise a gap is left between the forcing cone or tapered breech end of the liner and the

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orifice for passage of the firing pin therethrough; a longitudinal bore of a diameter which is that of the reduced calibre, the bore extending from the casing nose end towards a position inside the casing intermediate the rear and nose ends; an inward rim forming a missile seat at the rearward end of the bore and a narrow passageway for passing expansion gases generated by the primer detonating to the missile to propel the munition out of the bore and the firearm barrel.

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The base is preferably screwable onto the casing rear end after a primer has been placed in the primer seat and ^{is} unscrewable off the casing rear end to discard spent primer remains. Other preferred forms are defined in dependent claims.

In one preferred embodiment, the adaptor device further includes a barrel liner adapted to be pushed into the gun barrel through the muzzle end thereof until it abuts against the nose end of a casing loaded in the chamber. The liner has an external thread partly protruding out of the gun barrel mouth at the muzzle end, a sleeve made from a deformable plastics material and which covers a part of the liner tube after the thread and a nut for screwing onto the thread to tighten against the sleeve until the sleeve expands diametrically to press against the internal wall of the barrel, thereby immobilizing the liner tube. The liner has at least one O-ring housed in a respective circumferential groove adjacent to the rear end of the tube to keep it centered inside the barrel and maintain a gap along the length between the tube and the barrel.

In a particularly preferred embodiment, the casing houses a longitudinally displaceable cannon containing the longitudinal bore for loading the reduced calibre missile and spring means for urging the displaceable cannon towards the casing rear end, the nose end of the casing including an orifice fixed to enable the cannon to emerge therethrough under the effect of expansion gasses produced by a detonating primer

struck by the firing pin. The liner rear end may further be made of a relatively soft plastics material for initially absorbing strikes from a displaceable cannon in the casing until the material becomes sufficiently gorged to abut the cannon in a maximum displaced position.

Brief Description of the Drawings:

The above-stated and other novel features and aspects of this invention and how it may be reduced to practice may be understood better from the following detailed description of a preferred embodiment shown in the attached drawings, wherein:

Figure 1 is a longitudinal-cross section of an adaptor device, according to this invention, for a cylinder-type gun, such as a revolver or some large-calibre rifles.

Figure 2 is a longitudinal-cross section of an adaptor device, according to this invention, for a fixed-chamber gun, such as a large-calibre pistol.

Figure 3 is a longitudinal-cross section of a barrel of a pistol showing the adaptor device therein, according to an improved embodiment of the invention.

Figure 4 shows a liner tube of an adaptor device for a revolver, according to an improved embodiment of the invention.

Figure 5A shows a first embodiment of a rear tube of the adaptor device for the revolver of figure 4. Figure 5B illustrates the embodiment of figure 5A in a firing position.

Figure 6 shows a second embodiment of a rear tube of the adaptor device for the revolver of figure 4.

Figure 7 shows a third embodiment of a rear tube of the adaptor device for revolvers.

Finally, figure 8 shows a fourth embodiment of a rear tube of the adaptor device for revolvers.

Detailed Description of Preferred Embodiments:

Describing in detail how the above-stated invention may be put to practice, figure 1 shows an embodiment of the adaptor device 11 of the present invention for a revolver, typically (the firearm itself is not depicted in the drawings). The adaptor 11 comprises a tubular body 13 internally traversed by a longitudinal bore 15, preferably with rifling grooves 17 for increased precision.

The external diameter of the tube 13 is recessed at its forward part 19 by a step 21 for making a stop against the inlet mouth of the gun chamber. More precisely, the diameter of the forward part of the tube 13, between the step 21 and the outlet end 23, is that of the standard gun ammunition or bullet whereas the external diameter in the forward part 25 corresponds to the ammunition cartridge.

The rear end of the tube 13 itself is open, internally recessed and threaded for attaching a primer-holder 27 provided with a base 29 which continues in a ~~circumferential~~ ^{circumferential} flange 31. The base 29 is centrally traversed by a hole 33 extending towards a seat 35 for the primer 37, any of which marketed as "small pistol" or "large pistol" primers may be used. This seat 35 comprises a rear conical cavity, having a diameter decreasing towards the hole 33, and a forward cylindrical cavity, joined to one another, the latter closed in part by a primer retainer 39 formed by a cylindrical member having a central passage 41 coaxially aligned with the inlet end of the bore 15.

In an application of the adaptor 11 for .44-calibre Magnum revolver, as it is popularly called, the full length of the unit 11 is 41.9 mm, broken down as: 7.8 mm forward length 19, 32.6 mm rear length 25 and 1.5 mm width of the flange 31 at the base 27. The diameters of these three parts are 10.9 mm and 11.6 mm for the front 19 and rear 25 tubular parts, respectively, and 13.1 mm for the base 29, whereas the diameter of the bore 15 is 4.5 or 5.5 mm according to the am-

munition 43 to be used, the diameter of the gas passage hole 41 may be 1 mm and that of the seat 35 according to the size of the primer 37.

To load the adaptor 11, first the three members 13, 27 and 39 are disassembled, unscrewing the base 27 from the tubular body 13 to uncover and take out the primer-latch 39. A conventional pistol primer 37 is placed on the seat 35 through the forward mouth of the base 27 and a pellet 43 or round shot, also conventional, such as of 4.5 or 5.5 mm, is placed in the chamber of the bore 15 through the rear mouth of the latter. The cylindrical primer-latch 39 is replaced again to separate the pellet 43 from the primer 37 and the base 27 is screwed back on to the tube 13.

The cylindrical member 39 is for retaining the primer 37 in its seat 35 where it may be struck by the firing pin of the gun through the hole 33 when the shooter presses the trigger (not shown). The expansion gasses produced by the detonation flow through the passage 41 and drive the pellet 43 through the latter, thereby producing the shot.

The basic structure of the embodiment of figure 1 requires some changes when the adaptor device of the invention is for use with a gun having a chamber, as is the case of a pistol, for example a .45-calibre ACP pistol. The barrel 75 of the pistol is schematically drawn in figure 2 and is internally occupied in its entirety by the adaptor 81 of the present invention. The adaptor 81 comprises a liner tube 83 and a rear base 85. The latter is internally threaded for screwing on the primer-latch 87 which, in turn, is provided with a passage 89 for gasses recessed at its forward part to form a pellet-housing chamber 91.

The adaptor 81 is pushed into the barrel 75 through the chamber 77 until its outlet-end mouth 93 protrudes through the outlet mouth 79 of the barrel 75, revealing an external thread 95 for affixing a nut 97 for holding the adaptor 81 in place. The tube is further provided with an external circum-

pherential groove for housing an O-ring 99 to hold the adaptor 81 fast inside the barrel 75, specially during firing, thereby assisting in the aim of the shot.

5 The entire length of the adaptor 81 is at least 127 mm, 11.4 mm of which correspond to the base, the diameter of which is 12 mm. The middle part of the tube 83 which goes inside the barrel 75 of the pistol has a diameter slightly less than 11.4 mm.

10 A more preferred embodiment of the invention is set forth in figure 3 which schematically shows the barrel 75 of the pistol internally occupied by the adaptor 181 of the present invention. The adaptor 181 comprises an elongated liner tube 183 and a rear tube 187, shorter than the former, screwably closed behind by a base 185. The latter contains a housing
15 for a primer 37. The shape of the combination of the base 185 and the rear tube 187 is similar to a standard-calibre ammunition and includes a circumferential recess 201 abutting against a circumferential step in the chamber 77 which normally retains a standard ammunition cartridge.

20 However, the overall length of the combination 185-187 is advantageously shorter than that of standard-calibre ammunition as a means of protection against neglecting to take the liner 183 before shooting with real ammunition.

25 The rear tube 187 includes the gas passage 89 recessed at its forward part to form a pellet chamber 91. Gasses coming from a just-fired primer 37 are accelerated and decompressed through this passage, taking advantage of Venturi's principle to provide a silencer.

30 The liner tube 183 is pushed into the pistol barrel 75 through the outlet mouth 79 until it abuts against the rear tube 187 loaded in the chamber 77. The outlet mouth 193 of the liner tube is externally threaded 95 and in part protrudes out of the mouth of the gun barrel 75. A nut 197 is then screwed onto the thread 95 to press against a sleeve 203 made
35 from a deformable plastics material and which covers a part

of the liner tube 183 after the thread 95. The nut 197 is tightened until the sleeve 203 expands diametrically to press against the internal wall of the barrel 75, thereby immobilizing the liner tube 183.

5 The liner tube 183 has two O-rings 199 housed in respective circumferential grooves adjacent to the rear end of the tube 183 to keep it ~~centered~~ ^{centered} inside the barrel 75 and, more importantly, maintain a gap between the metallic wall of the tube and that of the barrel 75 which preserves the
10 grooves inside the latter.

Figure 4 shows the liner tube 183' adapted to revolvers for a quieter shot. No accessory tools are needed for loading and unloading the pellet 43. In this embodiment, the second O-ring 199 is replaced by a plastics rear end embodied by a
15 short length of tube 205 made of a material known as "DELRIN". The length of the liner tube 183' is such that the rear end 205 is at a scarce distance, advantageously in the order of a few tenths of a millimetre, from the forward end of the cylinder of the revolver (not illustrated), practically
20 abutting against the forcing cone of the revolver barrel when the liner tube 183' is inside the revolver barrel and immobilized by the nut 197 expanding the sleeve 203.

The elongated liner tube 183' of figure 4, which stays fixed inside the gun during a firing round, is complemented
25 by a second unit of the adaptor device 181' of the invention, formed by a short tubular member 11' having an external shape and size similar to standard-calibre ammunition for that gun, as illustrated in figures 5 and 6. This short tubular member 11', or "pseudobullet" as it could be termed, loads the
30 pellet 43 and the primer 37 for each shot. That is to say, in contrast to the forward tubular member 183', the rear tubular member 11' is changed for each shot, by the automatic turn of the cylinder, and has to be reloaded before it may be used again. It may be seen that both members 183' and 11' of the
35 adaptor 181' of the invention carry out different functions

Describing in detail the embodiment of the tubular member 11' shown in figure 5, it essentially comprises a tube 13' having an external diameter which is recessed at its forward part 19 by a step 21 capable of abutting against the chamber inlet mouth of the gun. More precisely, the diameter of the forward part of the tube 13', between the step 21 and the outlet end 23', is that of the bullet or standard ammunition for the gun whereas the external diameter in the forward part 25 corresponds to the ammunition cartridge.

20 The interior of the cannon 207 includes a bore 15
extending towards the forward end 23' of the rear member 11'
and dimensioned for housing the pellet 43. The bore 15 is
communicated backwardly with a passage 41 coaxial therewith.
25 The bore 15 of the barrel has a recess 208 to reduce the dia-
meter of the rear part to compensate for the barrel moving
forward against the plastics end 205 before the pellet exits.
30 The recess 208 further stops the primer from passing through
into the pellet chamber under the firing effect, specially
when primers 37 of the "SMALL" type are used.

More precisely, the opening in the forward end 23' of the tube 13' is big enough for the cannon 207 to be pushed forward and stick out of the tube 13'. The cannon 207 has a circumferential shoulder 209 which does not let the tube get completely out of the tube 13'. Furthermore, a spring 211, which is wound around the cannon 207 and has one end resting

Spelling error?

against the shoulder 209, urges the cannon 207 inside the tube 13'.

In order to load the rear member 11', the base 27' of the tube 13' is unscrewed, a fresh primer is placed on the seat 35 and the base 27' is placed back on again. A 4,5 mm pellet 43 or round shot, such as of the type marketed as "GAMO" or "TORCAZ" for example, is seated in the bore 15 through the forward mouth 23' of the rear tube 13' and the short tubular member 11' is inserted in one of the cylinder receptacles, the gun ready for use. In this case, hollow cup-like or "DIÁBOLO" pellets may be used in spite of their greater structural fragility, since part of the energy generated by the gasses in expansion is consumed in forcing the cannon against the spring 211, thereby reducing the power available for accelerating the pellet and, consequently, the destructive effect of the primer charge on this kind of ammunition which could otherwise become beheaded by an excess charge.

When the shooter presses the trigger (not shown), the firing pin of the gun strikes the primer 37 in seat 35 through the hole 33. The expansion gasses under the effect of the detonation propel the cannon 207 together with the ammunition 43, compressing the spring 211. Part of these gasses cross through the passage 41 and simultaneously accelerate the pellet 43 inside the cannon 207. The cannon 207 is propelled out of the tube 13, through the hole 23' and strikes against the "DELRIN" material 205 of the long tube 183'. In this manner, a closed system is formed inside the liner tube wherein both the pellet 43 as well as the propellant gasses coming from the primer 37 are impelled. The pellet 43 shoots out of the little cannon 207, thereby producing the shot, and the cannon 207 is retracted thereafter back into the tube 13' again by the reaction of the spring 211.

With use, the cannon 207 repetitively strikes the plastics 205 and gradually wears it down with each shot until

5 enough room is made to accomodate the little cannon 207 after some use. The inclusion of the displaceable cannon 207 provides compensation for different cylinder lengths found in revolvers of a same .38 o .357MAG calibre, thereby providing a universal adaptor system for a given calibre.

10 Figure 10⁷ illustrates an alternative embodiment of the rear tubular member 11", which features a primer-latch 39' included between the primer seat 33 and the chamber housing the cannon 207'. The primer-latch 39' screws on to the same thread that attaches the base 27'. Apart from this, this embodiment of the tubular member posterior 11" is similar to the one of figure 5.

15 Figure 11⁷ illustrates an alternative embodiment of the adaptor device of figure 1 which essentially consists of a rear-tubular unit 151' which may operate as an adaptor alone or in combination with the forward tubular unit 183' depicted in Figure 4. The object of this embodiment is to replace the displaceable cannon 207 of figures 5 and 6 with a tubular unit 151' of adjustable length, which the user may match to the length of the cylinder of his gun.

20 It comprises a base 155 which, at its forward part, features an internal thread 213 for attaching an intermediate tube 215 including a first stretch 41' of the gas passage. The intermediate tube 215 features in turn an internal thread 217 at its forward part for screwing on the short tube with adjustable penetration, the latter tube featuring the remaining parts of the gas passage stretch 41" and of the bore 15' for housing the pellet 43. The set formed by the base 155 and the intermediate tube 215 have diametrical and longitudinal dimensions corresponding to a standard-calibre ammunition cartridge of the gun whereas the forward tip of the pellet-holder tube 157 looks like a bullet of this calibre.

25 That is to say that the munition holder 157 is screwed into the intermediate tube 215 until the overall length of the unit assembled by the three members 155, 215 and 157

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